

## From the Editor

## Surface Analysis



The March 2011 issue of *Microscopy Today* contained a group of articles describing various types of surface analysis—measurements of elements and molecules from the top few atomic layers of a solid surface. Those articles featured basic explanations of X-ray photoelectron spectroscopy (XPS), Auger electron spectroscopy (AES), time-of-flight secondary ion mass spectrometry (ToF-SIMS), and low-energy ion scattering (LEIS). Some of the articles showed the imaging and depth profiling capabilities of these methods.

The present issue is an update of these surface analysis topics five years later. Guest Editor Don Baer organized this set of articles with an eye toward showing how the above methods, plus scanning transmission electron microscopy (STEM) and atom probe tomography (APT), complement one another to solve difficult practical problems. Baer introduces this surface analysis issue with an overview of the techniques and their current capabilities. Cecil Powell shows that use of XPS has grown significantly over the last 25 years and now appears in ten times more publications per year than either Auger or SIMS. Anderton and Gamble show how different types of SIMS instruments can provide images of the distributions of molecular species from biological specimens. Wang et al. show how STEM and SIMS can complement each other in *in-situ* analyses of functioning batteries. Finally, Baer et al. show how XPS can play an important role in the effort to determine compositions and thicknesses of multiple shells within nanoparticles exhibiting core-shell structures.

What's the take-away from the present group of articles? I learned the following: (a) useful chemical imaging is now available for most surface analysis methods, (b) the essential ultra-high vacuum specimen environment is now so routine that it is hardly mentioned, (c) well-designed *in-situ* experiments connected to surface analysis instruments can yield answers to real-world problems, and (d) tough analysis problems demand complementary techniques, easy-to-use modeling software, and clever experimental design.

I thank our guest editor, Don Baer, and all the authors of these articles. I look forward to further developments during the next five years.

Charles Lyman  
Editor-in-Chief

**Publication Objective:** to provide information of interest to microscopists.

*Microscopy Today* is a controlled-circulation trade magazine owned by the Microscopy Society of America that is published six times a year in the odd months. Editorial coverage spans all microscopy techniques including light microscopy, scanning probe microscopy, electron microscopy, ion-beam techniques, and the wide range of microanalytical methods. Readers and authors come from both the life sciences and the physical sciences. The typical length of an article is about 2,000 words plus figures and tables; feature articles are longer. Interested authors should consult "Instructions for Contributors" on the *Microscopy Today* website: [www.microscopy-today.com](http://www.microscopy-today.com).

ISSN 1551-9295

## Disclaimer

The Microscopy Society of America and the editors cannot be held responsible for opinions, errors, or for any consequences arising from the use of information contained in *Microscopy Today*. The appearance of advertising in *Microscopy Today* does not constitute an endorsement or approval by the Microscopy Society of America of any claims or information found in the advertisements. By submitting a manuscript to *Microscopy Today*, the author warrants that the article is original or that the author has written permission to use copyrighted material published elsewhere. While the contents of this magazine are believed to be accurate at press time, neither the Microscopy Society of America, the editors, nor the authors can accept legal responsibility for errors or omissions.

© Copyright 2016 by the Microscopy Society of America. All rights reserved.

## Editorial Staff

Charles E. Lyman, *Editor-in-Chief*  
[charles.lyman@lehigh.edu](mailto:charles.lyman@lehigh.edu)  
(610) 758-4249

Gennifer Levey, *Production Manager*  
[glevey@meridianartpro.com](mailto:glevey@meridianartpro.com)  
(212) 780-0315

Ron Anderson, *Executive Editor*  
[randerson20@tampabay.rr.com](mailto:randerson20@tampabay.rr.com)

Phil Oshel, *Technical Editor*  
[oshel1pe@cmich.edu](mailto:oshel1pe@cmich.edu)

Stephen Carmichael, *Columnist*  
[carmichael.stephen@mayo.edu](mailto:carmichael.stephen@mayo.edu)

Eric Clark, *Pioneers Editor*  
[eclark@magnet.fsu.edu](mailto:eclark@magnet.fsu.edu)

Steven Barlow, *Education Editor*  
[sbarlow@mail.sdsu.edu](mailto:sbarlow@mail.sdsu.edu)

Thomas E. Phillips, *Consulting Editor*  
[phillipst@missouri.edu](mailto:phillipst@missouri.edu)

E. Ann Ellis, *Microscopy 101 Editor*  
[eann.ellis@suddenlink.net](mailto:eann.ellis@suddenlink.net)

Paul Webster, *Calendar Editor*  
[pwebster@usc.edu](mailto:pwebster@usc.edu)

John Shields, *Humor Editor*  
[jpshield@uga.edu](mailto:jpshield@uga.edu)

Nikolaus Cordes, *Digital Content Editor*  
[ncordes@lanl.gov](mailto:ncordes@lanl.gov)

Thomas Kelly, *Chief Awards Judge*  
[Thomas.kelly@ametec.com](mailto:Thomas.kelly@ametec.com)

## Advertising Sales

M.J. Mrvica Associates, Inc.  
2 West Taunton Avenue, Berlin, NJ 08009  
[mjmrvica@mrvica.com](mailto:mjmrvica@mrvica.com)  
(856) 768-9360

Kelly Miller, *Account Manager*  
[kmiller@mrvica.com](mailto:kmiller@mrvica.com)

## Magazine website:

<http://www.microscopy-today.com>

Free subscriptions are available

## Publisher

Cambridge University Press  
32 Avenue of the Americas  
New York, NY 10013-2473  
(212) 337-5000

Circulation: 18,000

## Editorial Board

Arlan Bencotter, *Lehigh University*  
John Bozzola, *Southern Illinois University*  
Peter Crozier, *Arizona State University*  
Vinayak Dravid, *Northwestern University*  
David Grubb, *Cornell University*  
Bryan Huey, *University of Connecticut*  
John Mackenzie, *North Carolina State Univ.*  
Paul Maddox, *University of Montreal*  
Ania Majewska, *U. Rochester Med School*  
Greg Meeker, *U.S. Geological Survey*  
Joseph Michael, *Sandia National Labs*  
Caroline Miller, *Indiana University*  
Brian M. Patterson, *Los Alamos National Lab*  
Robert Price, *University of South Carolina*  
John Reffner, *John Jay College, SUNY*  
Ian Robertson, *University of Wisconsin*  
Phillip Russell, *Appalachian State University*  
Glenn Shipley, *Citizen Microscopist*  
Robert Simmons, *Georgia State University*  
Paul Voyles, *University of Wisconsin*  
Simon Watkins, *University of Pittsburgh*  
Cynthia Zeissler, *Nat. Inst. of Sci. and Tech. (NIST)*